United States
Environmental Protection Agency

Air and Radiation
Stratospheric Protection Division
6205J

Substitute Refrigerants Under SNAP as of June 8, 1999

SNAP Information: http://www.epa.gov/ozone/title6/snap/
Stratospheric Ozone Protection Hotline: (800) 296-1996

EPA has created the Significant New Alternatives Policy (SNAP) Program under section 612 of the Clean Air Act Amendments. SNAP evaluates alternatives to ozone-depleting substances. Substitutes are reviewed on the basis of ozone depletion potential, global warming potential, toxicity, flammability, and exposure potential as described in the March 18, 1994 final SNAP rule (59 FR 13044). Lists of acceptable and unacceptable substitutes will be updated periodically in the Federal Register. The following SNAP notices and subsequent final rules are included in this list: August 26, 1994 (59 FR 44240), January 13, 1995 (60 FR 3318), June 13, 1995 (60 FR 31092), July 28, 1995 (60 FR 38729), February 8, 1996 (61 FR 4736), May 22, 1996 (61 FR 25585), September 5, 1996 (61 FR 47012), October 16, 1996 (61 FR 54030), March 10, 1997 (62 FR 10700), June 3, 1997 (62 FR 30275) , February 24, 1998 (63 FR 9151), May 22, 1998 (63 FR 28251), January 26, 1999 (64 FR 3861), April 28, 1999 (64 FR 22981), and June 8, 1999 (64 FR 30410).

Acceptable Substitutes for Air Conditioning under the Significant New Alternatives Policy (SNAP) Program as of June 8, 1999

Substitutes (Name Used in the Federal Register)	Trade Name	CFC-11 Centrifugal Chillers	CFC-12, CFC-114, R-500 Centrifugal Chillers	CFC-12, R-500 Reciprocating Chillers	CFC-12 Motor Vehicle AC	CFC-114 Industrial Process AC	CFC-12, R-500 Residential Dehumidifiers
HCFC-123	123	R, N	N				
HCFC-22	22	N	N	N	R, N* (buses only)	N (only <115F)	R, N
HCFC-124	124		R, N (CFC-114 only)			R, N	
HFC-134a	134a	N	R, N	R, N	R, N*	N (only <125F)	R, N
HFC-227ea		N	N	N			
HFC-236fa			R, N (CFC-114 only)				
R-401A, R-401B	MP-39, MP-66			R, N		R, N	R, N
R-406A	GHG		R, N (R-500 only)		R, N**		R
R-409A (HCFC Blend Gamma)	409A			R, N			R
R-411A, R-411B	411A, 411B			R, N			

Key: R = Retrofit Uses, N = New Uses

*These refrigerants are actually "acceptable subject to use conditions." The conditions include 1)the use of unique fittings, 2)the use of descriptive labels, and 3) a prohibition against topping off one refrigerant with another. Details may be found in EPA's fact sheet titled "Choosing and Using Alternative Refrigerants for Motor Vehicle Air Conditioning."

** In addition to the use conditions listed under (*), these refrigerants must be used with barrier hoses.

Acceptable Substitutes for Air Conditioning under the Significant New Alternatives Policy (SNAP) Program as of June 8, 1999 (continued)

Substitutes (Name Used in the Federal Register)	Trade Name	CFC-11 Centrifugal Chillers	CFC-12, CFC-114, R-500 Centrifugal Chillers	CFC-12, R-500 Reciprocating Chillers	CFC-12 Motor Vehicle AC	CFC-114 Industrial Process AC	CFC-12, R-500 Residential Dehumidifiers
FRIGC (HCFC Blend Beta)	FRIGC FR-12		R, N (CFC-12, R-500 only)	R, N	R, N*		R, N
Free Zone (HCFC Blend Delta)	Freezone / RB-276		R, N (CFC-12, R-500 only)	R, N	R, N*		R, N
Blend Zeta	Ikon				R, N*		
Hot Shot	Hot Shot, Kar Kool		R, N (CFC-12, R-500 only)	R, N	R, N**		R, N
GHG-X4	GHG-X4, Autofrost, Chill-it		R, N (CFC-12, R-500 only)	R, N	R, N**		R, N
GHG-X5	GHG-X5		R, N (CFC-12, R-500 only)	R, N	R, N**		R, N
GHG-HP (HCFC Blend Lambda)	GHG-HP				R, N**		R, N
Freeze 12	Freeze 12		R, N (CFC-12, R-500 only)	R, N	R, N*		R, N
G2018C	411C		R, N (CFC-12, R-500 only)	R, N			
HCFC-22/HCFC-142b			R, N (CFC-12 only)	R, N (CFC-12 only)			R, N (CFC-12 only)
Ammonia Vapor Compression		N	N				
Evaporative Cooling		N	N	N	N*		
Desiccant Cooling		N	N	N			
Ammonia / Water Absorption		N	N				
Water / Lithium Bromide Absorption		N	N				

Key: R = Retrofit Uses, N = New Uses

*These refrigerants are actually "acceptable subject to use conditions." The conditions include 1)the use of unique fittings, 2)the use of descriptive labels, and 3) a prohibition against topping off one refrigerant with another. Details may be found in EPA's fact sheet titled "Choosing and Using Alternative Refrigerants for Motor Vehicle Air Conditioning."

** In addition to the use conditions listed under (*), these refrigerants must be used with barrier hoses.

Acceptable Substitutes for Commercial Refrigeration under the Significant New Alternatives Policy (SNAP) Program as of June 8, 1999

Substitutes (Name Used in the Federal Register)	Trade Name	ODS Being Replaced	Cold Storage Ware-houses	Ref. Transport	Retail Food Ref.	Ice Machines	Vending Machines	Water Coolers	Non-Mecha-nical Heat Transfer	Very Low Temp. Ref.
HCFC-22	22	12, 502	R, N	R, N	R, N	N	R, N	N		
HFC-23	23	12, 13, 13B1, 503								R, N
HFC-134a	134a	12	R, N	R, N	R, N	N	R, N	R, N		
HFC-227ea		12	N		N					
HFC-236fa		114							R, N	
R-401A, R-401B	MP39, MP66	12	R, N	R, N	R, N	R, N	R, N	R, N		
R-402A, R-402B	HP80, HP81	502	R, N	R, N	R, N	R, N				
R-404A	HP62, 404A	502	R, N	R, N	R, N	R, N	R, N			
R-406A	GHG	12, 500	R	R	R	R	R	R		
R-407A, R-407B	Klea 407A, 407B	502	R, N	R, N	R, N	R, N				
R-408A (HCFC Blend Epsilon)	408A	502	R	R	R	R				
R-409A (HCFC Blend Gamma)	409A	12		R	R	R	R	R		
R-411A, R-411B	411A, 411B	12, 500, 502	R, N	R, N	R, N	R, N	R, N	R, N		
R-507	AZ-50	502	R, N	R, N	R, N	R, N	R, N			
R-508A	KLEA 5R3	13, 13B1, 503								R, N
R-508B	SUVA 95	13, 13B1, 503								R, N
FRIGC (HCFC Blend Beta)	FRIGC FR-12	12, 500	R, N	R, N	R, N	R, N	R, N	R, N		
Free Zone (HCFC Blend Delta)	Free Zone / RB-276	12	R, N	R, N	R, N	R, N	R, N	R, N		
Hot Shot	Hot Shot	12, 500	R, N	R, N	R, N	R, N	R, N	R, N		
GHG-X4	GHG-X4	12, 500	R, N	R, N	R, N	R, N	R, N	R, N		
GHG-X5	GHG-X5	12, 500	R, N	R, N	R, N	R, N	R, N	R, N		
(HCFC Blend Lambda)	GHG-HP	12	R, N	R, N	R, N	R, N	R, N	R, N		
FREEZE 12	FREEZE 12	12	R, N	R, N	R, N	R, N	R, N	R, N		
G2018C	411C	12, 500, 502	R, N	R, N	R, N	R, N	R, N	R, N		
HCFC-22/HCFC-142b		12	R, N	R, N	R, N	R, N	R, N	R, N		
Ammonia Vapor Compression		all	N		N	N				

Acceptable Substitutes for Commercial Refrigeration under the Significant New Alternatives Policy (SNAP) Program as of June 8, 1999 (continued)

Substitutes (Name Used in the Federal Register	Trade Name	ODS Being Replaced	Cold Storage Ware-houses	Ref. Transport	Retail Food Ref.	Ice Machines	Vending Machines	Water Coolers	Non-Mecha-nical Heat Transfer	Very Low Temp. Ref.
Galden Fluids		11, 12, 113, 114, 115							R	
Evaporative/Desiccant Cooling		all	N							
Stirling Cycle		all		N						
Direct Nitrogen Expansion		all		N						
Pressure Stepdown		all	N							
CO_2		11, 12, 13, 113, 114, 115, 13B1, 503							R, N	R, N
Self-chilling cans using CO_2		12, 502	R, N	R, N	R, N		R, N			
Volatile Methyl Silixanes, Water, Mineral Oil		11, 12, 113, 114, 115							R, N	
C_3F_8 , C_4F_{10} , C_5F_{12} , $C_5F_{11}NO$, C_6F_{14} , $C_6F_{13}NO$, C_7F_{16} , $C_7F_{15}NO$, C_8F_{18} , $C_8F_{16}O$, and $C_9F_{21}N$									R, N*	
NARM-502		13,13B1,503								R, N
THR-04	THR-04	502	R, N	R, N	R, N	R, N	R, N	R, N		
HFE-7100		113							R, N	

Key: R = Retrofit Uses, N = New Uses
*Acceptable only where no other alternatives are technically feasible due to safety or performance requirements.

Acceptable Substitutes for Non-Commercial Refrigeration under the Significant New Alternatives Policy (SNAP) Program as of June 8, 1999

Substitutes (Name Used in the Federal Register)	Trade Name	ODS Being Replaced	Industrial Process Refrigeration	Ice Skating Rinks	Household Refrigerators	Household Freezers
HCFC-123	123	11	R, N			
HCFC-22	22	12, 502	R, N	R, N	R, N	R, N
HFC-23		13, 13B1, 503	R, N			
HFC-134a	134a	12	R, N		R, N	R, N
HFC-152a		12			N	N
HFC-227ea		12	N			
HFC-236fa		114	R,N			
R-401A, R-401B	MP-39, MP-66	12	R, N	R	R, N	R, N
R-402A, R-402B	HP-80, HP-81	502	R, N			R, N
R-403B	Isceon 69-L	13, 13B1, 503	R, N*			
R-404A	HP-62, 404A	502	R, N			R, N
R-406A	GHG	12, 500	R		R	R
R-407A, R-407B	Klea 407A, 407B	502	R, N	R, N		
R-408A (HCFC Blend Epsilon)	408A	502	R			
R-409A (HCFC Blend Gamma)	409A	12			R	R
R-411A, R-411B	411A, 411B	12, 500, 502	R, N			
R-507	AZ-50	502	R, N			
R-508A	KLEA 5R3	13, 13B1, 503	R, N			
R-508B	Suva 95	13, 13B1, 503	R, N			
FRIGC (HCFC Blend Beta)	FRIGC FR-12	12, 500	R, N		R, N	R, N
Free Zone (HCFC Blend Delta)	Free Zone / RB-276	12	R, N	R, N	R, N	R, N
Hot Shot	Hot Shot	12, 500	R, N	R, N	R, N	R, N
GHG-X4	GHG-X4	12, 500	R, N	R, N	R, N	R, N
GHG-X5	GHG-X5	12, 500	R, N		R, N	R, N
(HCFC Blend Lambda)	GHG-HP	12	R, N		R, N	R, N
FREEZE 12	FREEZE 12	12	R, N	R, N	R, N	R, N

Acceptable Substitutes for Non-Commercial Refrigeration under the Significant New Alternatives Policy (SNAP) Program as of June 8, 1999 (continued)

Substitutes (Name Used in the Federal Register)	Trade Name	ODS Being Replaced	Industrial Process Refrigeration	Ice Skating Rinks	Household Refrigerators	Household Freezers
G2018C	411C	12, 500, 502	R, N	R, N		
NARM-502	NARM-502	13, 503	R, N			
THR-01	THR-01	12			N	N
THR-04	THR-04	502	R, N	R, N	R, N	
HCFC-22/HCFC-142b		12	R, N		R, N	R, N
CO_2		13, 13B1, 503	R, N			
Ammonia Vapor Compression		12, 502	R, N	R, N		
Ammonia Absorption		12			N	N
Propane, Propylene, Butane, HC Blend A, B	HC-12a, OZ-12	all	R, N*			
Self-chilling cans using CO_2		12, 502			R, N	
Chlorine		all	R, N			
Evaporative/Desiccant Cooling		all	N			

Key: R = Retrofit Uses, N = New Uses

*Prohibited for other end-uses. See the list of unacceptable refrigerants below.

Unacceptable Substitute Refrigerants
Significant New Alternatives Policy (SNAP) Program as of June 8, 1999

Substitutes (Name Used in the Federal Register)	Trade Name	ODS Being Replaced	End-Uses	Reason
All flammable refrigerants, including OZ-12 (Hydrocarbon Blend A) and HC-12a (Hydrocarbon Blend B)		CFC-12	Motor Vehicle Air Conditioning, retrofit and new	lack of adequate risk assessment that characterizes incremental flammability risk
OZ-12 (Hydrocarbon Blend A) and HC-12a (Hydrocarbon Blend B)	OZ-12, HC-12a	CFC-12	All end-uses other than Industrial Process Refrigeration, retrofit and new	lack of adequate risk assessment that characterizes incremental flammability risk
R-176*		CFC-12	All end-uses, retrofit and new	contains CFC-12
R-403B		R-502	All end-uses other than Industrial Process Refrigeration, retrofit and new	contains a perfluorocarbon that exhibits extremely high GWP and very long lifetime
R-405A		CFC-12	All end-uses, retrofit and new	contains a perfluorocarbon that exhibits extremely high GWP and very long lifetime
MT-31		CFC-12, HCFC-22	All end-uses, retrofit and new	a chemical contained in this blend presents an unacceptable toxicity risk
MT-31-1		CFC-12, HCFC-22	All end-uses, retrofit and new	a chemical contained in this blend presents an unacceptable toxicity risk
Hexafluoropropylene (HFP) and all HFP-containing blends		CFC-12, HCFC-22	All end-uses, retrofit and new	presents an unacceptable toxicity risk
NARM-22		HCFC-22	All end-uses, retrofit and new	contains HCFC-22

*R-176 contains CFC-12, HCFC-22. and HCFC-142b. It is a different product from RB-276, typically sold under the name "Freezone."

Acceptable Substitutes for Class II (HCFCs) Substances in Air Conditioning and Refrigeration under the Significant New Alternatives Policy (SNAP) Program as of June 8, 1999

Substitutes (Name Used in the Federal Register)	Trade Name	Household and Light Commercial AC	Commercial Comfort Air Conditioning	Industrial Process Refrigeration	Industrial Process Air Conditioners	Cold Storage Warehouse Systems	Ice Skating Rinks	Refrigerated Transport	Retail Food Refrigeration	Ice Machines	Household and other Refrigerated Appliances
R-410A	AZ-20	N	N	N	N	N	N	N	N	N	N
R-410B	Suva 9100	N	N	N	N	N	N	N	N	N	N
R-407C	Suva 9000, KLEA 66	R, N	R, N	R, N	R, N	R, N	R, N	R, N	R, N	R, N	R, N
R-134a	HFC-134a	N	-	-	-	-	-	-	-	-	-
R-507	AZ-50	N	N	N	N	N	-	N	N	N	-
Self-chilling cans using CO_2		-	-	-	-	R, N	-	R, N	R, N	-	R, N
Ammonia		N[1]	N[2]	N[3]	N[3]	N[3]	N[3]	-	N[4]	N[3]	N[1]
Evaporative Cooling		N	N	-	N	-	-	-	-	-	-
Desiccant Cooling		N	N	-	N	-	-	-	-	-	-
Water/Lithium bromide		-	N	-	-	-	-	-	-	-	-

Key: R = Retrofit Uses, N = New Uses, (-) = Not submitted for review against this end use or not practical to use the substitute refrigerant in this end use.
1. Absorption systems; 2. Absorption chillers or vapor compression with secondary loop; 3. Vapor compression or absorption systems; 4. Vapor compression with a secondary loop.

Description of Class II End Uses

End Use	Air Conditioning and Refrigeration Systems or Applications	Ozone Depleting Substance[1]
Household and Light Commercial Air Conditioning	Heat pumps, central air conditioning, direct-expansion commercial air conditioners, packaged terminal air conditioners, room air conditioners, and split system air conditioners	HCFC-22
Commercial Comfort Air Conditioning	Reciprocating, centrifugal and screw chillers	HCFC-22, CFC-12, R-500, and CFC-11
Industrial Process Refrigeration	Refrigeration applications within the chemical, pharmaceutical and petrochemical industries, the oil and gas industry, the metallurgical industry, civil engineering, sports and leisure facilities, and food processing.	HCFC-22, CFC-12, R-500, and R-502
Industrial Process Air Conditioning	Air conditioning systems that perform a critical mission in a high-temperature industrial environment, such as cooling a control cab on a crane in a foundry or protecting a computer room in a steel mill.	HCFC-22, CFC-12, and CFC-114
Cold Storage Warehouse Systems	Public and private facilities used to store meat, produce, dairy products, frozen food, and other perishable goods.	HCFC-22, R-502 and CFC-12
Ice Skating Rinks	Ice Skating Rinks	HCFC-22, CFC-12, and R-502
Refrigerated Transport	Refrigeration systems in trucks, trailers, railcars, ships, internodal containers, on board ships, and air conditioning systems in buses and passenger trains.	CFC-12, R-500 and R-502
Retail Food Refrigeration	Stand alone refrigeration cases found in small markets, convenience stores, restaurants and other food establishments, large systems found in supermarkets, and HCFC-22 systems found in a wide variety of retail and service establishments.	HCFC-22, CFC-12, and R-502
Ice Machines	Small, medium, and large ice makers used by a number of entities including restaurants and hotels.	CFC-12
Household and Other Refrigerated Appliances	Refrigerators, freezers, water coolers, vending machines, and dehumidifiers.	CFC-12 and R-502

1. Substitution through retrofit is only applicable to HCFC-22 systems.

Alternative Refrigerant Manufacturers

Refrigerant	Allied Signal	Dupont	Elf Atochem	ICI	People's Welding Supply	Greencool	Refrigerant Gases	IKON	Intermagnetics General	ICOR	Technical Chemical
	800-522-8001	800-235-7882	800-343-7940	800-275-5532	800-382-9006	703-643-2376	888-373-3066	505-345-2707	800-555-1442	800-357-4062	800-527-0885
HCFC-123	Genetron 123	Suva 123	Forane 123								
HCFC-22	Genetron 22	Freon 22	Forane 22	Arcton-22							
HFC-134a	Genetron 134a	Suva 134a	Forane 134a	Klea 134a							
HCFC-124	Genetron 124	HCFC-124	Forane 124								
R-401A, R-401B	MP39, MP66	Suva MP39, MP66	Forane 401A, 401B								
R-402A, R-402B	HP80, HP81	Suva HP80, HP81	Forane 402A, 402B								
R-404A	Genetron 404A	Suva HP62	Forane 404A								
R-406A					GHG						
R407A, R-407B				Klea 407A, 407B							
R-408A	Genetron 408A	Suva 408A	Forane 408A								
R-409A	Genetron 409A	Suva 409A	Forane 409A								
R-411A, R-411B						R-411A, B					
R-507	AZ-50	Suva 507									
R-508A				Klea 5R3							
R-508B		Suva 95									
HCFC Blend Beta									FRIGC FR-12		
HCFC Blend Delta							Free Zone / RB-276				
GHG-X4					Autofrost / Chill-It						
GHG-X5					GHG-X5						
GHG-HP					GHG-HP						
Hot Shot										Hot Shot	
Blend Zeta								IKON-12			
Freeze 12											Freeze 12
G2018C						R-411C					